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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
MAYO III, WILLIAM H	
ART UNIT	PAPER NUMBER
2831	

DATE MAILED: 03/13/2003 16

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/673,143	PRIGENT ET AL.	
	Examiner	Art Unit	
	William H. Mayo III	2831	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 January 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spendal et al (Pat Num 5,246,783, herein referred to as Spendal) in view of Maxfield et al (Pat Num WO 93/04117, herein referred to as Maxfield). Spendal discloses power cable (Figs 4a-4b) comprising at least one covering layer (Col 10, lines 63-68). Specifically, with respect to claim 1, Spendal discloses a power cable (Fig 4a) comprising a conductive material core (denoted as conductor) and

at least one covering layer (denoted as inner and outer semiconductor shields and insulation) wherein the at least one covering layer (denoted as inner and outer semiconductor shields) may comprise an inorganic compound (i.e. carbon black & clay, Col 10, lines 20-28) of sheet structure (Fig 4a) and an organic compound (i.e. polyethylene, denoted as insulation layer) inserted between the layers (inner and outer semiconductor layers) of inorganic compound (i.e. carbon black and clay). With respect to claim 2, Spendal discloses inorganic compounds (i.e. carbon black & clay), which are inorganic oxides. With respect to claim 3, Spendal discloses that the inorganic oxide may be clay, such as kaolin (Col 10, lines 20-23). With respect to claim 5, Spendal discloses that the organic compound, may be polyethylene (Col 9, lines 1-2), which is a polymer. With respect to claim 6, Spendal discloses that the polymer may be selected from a group of polyolefin (i.e. polyethylene is a polyolefin). With respect to claim 8, Spendal discloses that the at least one covering layer (Fig 4a) comprises an insulative layer (denoted as insulation, Col 11, lines 10-13) that may comprise an inorganic compound (i.e. carbon black & clay) of sheet structure (Fig 4a) and an organic compound (polyethylene) inserted between the layers (semiconductive layers) of inorganic compound (i.e. carbon black & clay). With respect to claim 9, Spendal discloses that the at least one covering layer (Fig 4a) comprises an jacket layer (i.e. external cover layer denoted as jacket, Col 11, lines 10-13) that may comprise an inorganic compound (i.e. carbon black & clay) of sheet structure (Fig 4a) and an organic compound (polyethylene) inserted between the layers (semiconductive layers) of inorganic compound (i.e. carbon black & clay).

With respect to claim 10, Spendal discloses that the at least one covering layer (Fig 4a) comprises an semiconductive screen (denoted as semiconductive layer, Col 8, lines 4860) that may comprise an inorganic compound (i.e. carbon black & clay, Col 10, lines 20-25) of sheet structure (Fig 4a) and an organic compound (polyethylene) inserted between the layers (semiconductive layers) of inorganic compound (i.e. carbon black & clay). With respect to claim 11, Spendal discloses a method of fabricating a power cable (Fig 4a) including the steps providing the inorganic compound (i.e. carbon black & clay) and combining it with an organic compound (i.e. polyethylene), inserting the organic compound (i.e. polyethylene) between the layers (semiconductor layers) of containing the inorganic compounds (carbon black & clay) at a temperature higher than the temperature at which the organic compound (polyethylene) soften or melts (i.e. extrusion process, Col 10, lines 5-10) and obtaining a material (insulation layer) with an organic compound (i.e. polyethylene) between the semiconductive layers containing the inorganic compound (i.e. carbon black & clay). With respect to claim 15, Spendal discloses a method wherein the at least one covering layer (Fig 4a) comprises an semiconductive screen (denoted as semiconductive layer, Col 8, lines 48-60) that may comprise an inorganic compound (i.e. carbon black & clay, Col 10, lines 20-25) of sheet structure (Fig 4a) and an organic compound (polyethylene) inserted between the layers (semiconductive layers) of inorganic compound (i.e. carbon black & clay). With respect to claim 17, Spendal discloses a method wherein the at least one covering layer (Fig 4a) comprises an insulative layer (denoted as insulation, Col 11, lines 10-13) that may comprise an

inorganic compound (i.e. carbon black & clay) of sheet structure (Fig 4a) and an organic compound (polyethylene) inserted between the layers (semiconductive layers) of inorganic compound (i.e. carbon black & clay), which is surrounded by an external covering layer (denoted as semiconductive layer, Col 8, lines 48-60) that may comprise an inorganic compound (i.e. carbon black, Col 10, lines 20-25) of sheet structure (Fig 4a) and an organic compound (polyethylene) inserted between the layers (semiconductive layers) of inorganic compound (i.e. carbon black & clay).

However, Spendal doesn't necessarily disclose the inorganic compound being made from nanocomposite material (claims 1, 8, 9, 13), nor the inorganic compound being an inorganic oxide being clay chosen from montmorillonite or bentonite (claim 4), nor the polymer being selected from epoxy resin, polyester, polyamide, polyimide, polyetherimide, polyamide, polyurethane, silicone, or a mixture thereof (claim 7), nor the inorganic compound being a clay and said compatibilizing agent being selected from quaternary ammonium salt, an oxide of polyethylene, and a phosphorus containing derivative (claims 12 & 16), nor the material having a particle size equal to 1 nanometer (claim 14), nor the method of treating layers of inorganic compound with an agent to render it compatible with an organic compound while exfoliating the inorganic compound (claims 11, 15, & 17).

Maxfield teaches a polymeric nanocomposite composition that may be used as an molded article for electrical devices (Page 35, lines 31-35) and that exhibits improved properties over the monomer blending and polymerizing

processes of the prior art (Page 3, lines 8-10), such as improved tensile yield strength, tensile modulus and/or ultimate elongation (Page 6, lines 1-4), greater mechanical reinforcement to polymer matrixes and imparts lower permeability to polymers (Pages 2-3, lines 37 & 17). Specifically, with respect to claim 1, Maxfield teaches that the flowable mixture comprising a polymer containing an inorganic material that has an inorganic compound being made from nanocomposite material (abstract). With respect to claim 4, Maxfield teaches that the inorganic compound may be an inorganic oxide such as montmorillonite clay (Page 10, lines 25-32). With respect to claim 7, Maxfield teaches that the organic material may be a polymer such as polyester, polyamide, polyetherimide, polyurethane (all cited on Page 26), and silicone, or a mixture thereof (cited on Page 27). With respect to claim 8, Maxfield teaches that the flowable mixture comprising a polymer containing an inorganic material that has an inorganic compound being made from nanocomposite material (abstract). With respect to claim 9, Maxfield teaches that the flowable mixture comprising a polymer containing an inorganic material that has an inorganic compound being made from nanocomposite material (abstract). With respect to claim 11, Maxfield teaches method of forming at least one layer comprising treating the layers of an inorganic compound, such as clay, with an agent (i.e. swelling/compatibilizing agents) to render the inorganic material compatible (Pages 1 & 2, lines 36-37 & 1-4), wherein an organic compound (i.e. polymer) is inserted between the inorganic materials at a temperature higher than the temperature at which the organic compound (i.e. polymer) softens or melts to exfoliate the inorganic

compound (Pages 7-8, lines 31-36 & 1-2, respectively). With respect to claim 12, Maxfield teaches a method of fabricating the at least one conductive layer of the power cable, wherein the inorganic compound may be a clay and a compatibilizing agent being selected from quaternary ammonium complexes (i.e. salts, Page 39, lines 31). With respect to claim 13, Maxfield teaches a method of fabricating the at least one conductive layer of the power cable, wherein the flowable mixture comprising a polymer containing an inorganic material that has an inorganic compound being made from nanocomposite material (abstract). With respect to claim 14, Maxfield teaches a method of fabricating the at least one conductive layer of the power cable, wherein the organic material has a particle size that may be less than 50 A (i.e. less than 5 nanometers. With respect to claim 15, Maxfield teaches a method of fabricating the at least one conductive layer of the power cable, wherein the nanocomposite material comprises an exfoliated inorganic compound (Pages 7-8, lines 31-36 & 1-2, respectively). With respect to claim 16, Maxfield teaches a method of fabricating the at least one conductive layer of the power cable, wherein the inorganic compound may be clay and a compatibilizing agent being selected from quaternary ammonium complexes (i.e. salts, Page 39, lines 31). With respect to claim 17, Maxfield teaches a method of fabricating the at least one conductive layer of the power cable, wherein the nanocomposite material comprises an exfoliated inorganic compound (Pages 7-8, lines 31-36 & 1-2, respectively).

With respect to claims 1, 4, 8-9, and 11 -17, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify

the inorganic polymeric composition of Spendal to comprise a nanocomposite in organic composition as taught by Maxfield because Maxfield teaches that such a inorganic polymeric nanocomposite composition that may be used as an molded article for electrical devices (Page 35, lines 31-35), exhibits improved properties over the monomer blending and polymerizing processes of the prior art (Page 3, lines 8-10), such as improved tensile yield strength, tensile modulus and/or ultimate elongation (Page 6, lines 1-4), greater mechanical reinforcement to polymer matrixes and imparts lower permeability to polymers (Pages 2-3, lines 37 & 1-7).

Response to Arguments

4. Applicant's arguments filed January 14, 2003 have been fully considered but they are not persuasive. The applicant argues the following:

A) The combination of the references fails to disclose or suggest all of the claimed combination of features and therefore doesn't establish a proper prima facie case of obviousness.

B) Spendal doesn't disclose or suggest an inorganic compound being made of nanocomposite material.

C) The combination of Spendal and Maxfield fails to disclose or suggest that the at least one covering layer is constituted essentially of a material comprising an inorganic compound made from a nanocomposite material (claim 1) or treating the layers of inorganic compound with an agent to render it compatible with an

inorganic compound while exfoliating the inorganic compound (claim 11).

D) There is no proper motivation for combining the Spendal with Maxfield because the combination doesn't teach the teaching of the claimed invention as disclosed on page 6, lines 30-37.

E) One of ordinary skill in the art would not have been motivated to combine Maxfield with Spendal to produce the claimed invention, because Maxfield discloses that it's inorganic material may be used in a number of applications, which include sports equipment and bottles, however not for semiconducting layers of a power cable.

F) It is unclear how the nanocomposite material of Maxfield would be used in semiconducting shield of Spendal.

With respect to arguments A, B, & C, the examiner respectfully traverses. Spendal does disclose all claim limitations including a cable (Fig 4a) comprising a conductive material core (denoted as conductor) and at least one covering layer (denoted as inner and outer semiconductor shields and insulation) wherein the at least one covering layer (denoted as inner and outer semiconductor shields) may comprise an inorganic compound (i.e. carbon black & clay, Col 10, lines 20-28) of sheet structure (Fig 4a) and an organic compound (i.e. polyethylene, denoted as insulation layer) inserted between the layers (inner and outer semiconductor layers) of inorganic compound (i.e. carbon black and clay) and a method of forming such. It has been stated on the record, that Spendal doesn't necessarily disclose the inorganic compound being made from

nanocomposite material (claim 1), nor the method of treating layers of inorganic compound with an agent to render it compatible with an organic compound while exfoliating the inorganic compound (claim 11, see rejection above). However, Maxfield teaches a polymeric nanocomposite composition that may be used as an molded article for electrical devices (Page 35, lines 31-35) and that exhibits improved properties over the monomer blending and polymerizing processes of the prior art (Page 3, lines 8-10), such as improved tensile yield strength, tensile modulus and/or ultimate elongation (Page 6, lines 1-4), greater mechanical reinforcement to polymer matrixes and imparts lower permeability to polymers (Pages 2-3, lines 37 & 17). The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Spendal discloses an electrical device (i.e. power cable), comprising at least one covering layer, whereby there is a need for the at least one covering layer to have good mechanical and dielectric properties (Col 3, lines 25-30), wherein the semiconducting and insulative polymeric materials of the at least one covering layer contain inorganic materials in order to improve the mechanical and dielectric properties. While Spendal doesn't disclose that the inorganic materials particle size, it is well known in the art of cables that conventional particle sizes are on the order of

micron size. This assertion is even supported by the applicant's specification (see Page 2, lines 12-15 of applicant's specification). Maxfield teaches a polymeric nanocomposite composition and method of producing the composite, that may be utilized in electrical devices (Page 35, lines 31-35), that exhibits improved mechanical and electrical properties over prior art compositions that have loadings of conventional reinforcing polymers having reinforcing fillers of micron size (Page 3, lines 1-10), such as improved tensile strength such as improved tensile yield strength, tensile modulus and/or ultimate elongation (Page 6, lines 1-4), greater mechanical reinforcement to polymer matrixes and imparts lower permeability to polymers (Pages 2-3, lines 37 & 17). Therefore, based on the teaching of Maxfield it would have been obvious to modify the inorganic polymeric composition of Spendal to comprise a nanocomposite inorganic composition as taught by Maxfield because Maxfield teaches that such a inorganic polymeric nanocomposite composition **exhibits improved mechanical and electrical properties over prior art compositions that have loadings of conventional reinforcing polymers having reinforcing fillers of micron size** (Page 3, lines 1-10), such as improved tensile strength such as improved tensile yield strength, tensile modulus and/or ultimate elongation (Page 6, lines 1-4), greater mechanical reinforcement to polymer matrixes and imparts lower permeability to polymers (Pages 2-3, lines 37 & 17). Secondly, there clearly exist an expectation of success because both references are concerned with increasing both electrical and mechanical properties of electrical devices, by incorporating inorganic fillers in polymeric materials, wherein the same polymeric

materials are utilized by both Spendal and Maxfield (see Col 6, lines 38-44 in Spendal and Pages 25-29 of Maxfield). Thirdly, all of the claimed elements are disclosed in the combination. Certainly the teaching reference, Maxfield, teaches a clear line of reasoning as why one of ordinary skill in the art would want to substitute nanocomposite inorganic materials in a polymeric composition, as opposed to micron size particles of the conventional polymeric compositions. In light of the above comments, the examiner respectfully states that all of the criteria for establishing a proper prima facie case of obviousness, as defined by the MPEP section 2100, is present, and therefore the rejection under 35 USC 103(a) is proper and just.

With respect to argument D, the examiner respectfully traverses. While the combination of Spendal and Maxfield may not disclose the teachings of the applicant's specification cited on Page 6, lines 30-36, clearly the teachings of both Spendal and Maxfield to improve both electrical and mechanical properties of the electrical device is a motivation to combine the teaching of both. These mechanical and electrical properties are also properties that the applicant also intends the claimed invention exhibits (see page 6, lines 7-22 of applicant's specification). While all of the teaching are not disclosed in the combination of Spendal and Maxfield, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

With respect to argument E, the examiner respectfully traverses. Clearly, as stated above, there exist a proper prima facie case of obviousness for the combination of Spendal and Maxfield. While Maxfield doesn't explicitly state that the composition should be utilized in a power cable, it clearly states that the composition may be utilized in any environment, where there exists a polymeric composition having inorganic filler being of micron size, one of those environments being in electrical devices. Spendal clearly teaches an electrical device (see title of Spendal), such as an electrical cable having a polymeric composition having inorganic fillers. Therefore, while Maxfield discloses several environments wherein the nanocomposite polymeric material may be utilized, one cannot ignore the teaching of the nanocomposite material being utilized in electrical devices, such as a cable.

With respect to argument F, the examiner respectfully traverses. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981) (see response to arguments A-C).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. They are Smith (Pat Num 6,238,790), which discloses an

insulation for high voltage cables, and Ryang et al (Pat Num 5,780,525) and Frisk (Pat Num 5,876,812), both of which disclose a nanocomposite materials.

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Communication

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to William H. Mayo III whose telephone number is (703) 306-9061. The examiner can normally be reached on M-F 8:30am-6:00 pm (alternate Fridays off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dean Reichard can be reached on (703) 308-3682. The fax phone numbers for the organization where this application or proceeding is

assigned are (703) 305-3432 for regular communications and (703) 305-3431 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

WHM III
March 3, 2003